THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

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THE PLANT DISEASE WARNING SERVICE IN 1950

Supplement 197 November 15, 1950

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DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland

THE PLANT DISEASE WARNING SERVICE IN 1950

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INTRODUCTION

In 1950 the diseases under consideration in the Crop Plant Disease Forecasting Program, namely, late blight of potato and tomato (Phytophthora infestans (Mont.) de Bary), tobacco blue mold (Peronospora tabacina Adam), and cucurbit downy mildew (Pseudoperonospora cubensis (Berk. & Curt.) Rostow.) were quite prevalent and in many cases very destructive. Several factors combined to encourage their destructiveness, a major one being the extremely favorable weather conditions of a cool-wet summer, ranging from six weeks to three months, over most of the plant-growing area.

As one result of this extremely favorable weather, late blight on tomatoes attained the most widespread distribution ever recorded in this country, with severity and loss equalling or possibly exceeding that suffered from the destructive 1946 outbreak. The disease moved westward, appearing in States where it had never been reported previously. It was widely reported in commercial acreages. In many cases untreated fields were completely destroyed. Infection of southern-grown transplants was again a contributing factor in occurrence and severity, according to reports from several areas, especially Mississippi, Illinois, Virginia, New Jersey, and Pennsylvania.

Regarding blue mold of tobacco, following the high January temperatures which were as much as 12 degrees above normal, this disease could have become very active. Extensive destruction was prevented by the warm-dry weather of February in the southern Atlantic States, the mildness of attack in other cases, and the thoroughness and effectiveness of control measures employed by growers.

Cucurbit downy mildew was more active on the watermelon crop this year than heretofore. This differential rate of development of downy mildew on watermelons and cantaloupes, which was noted by pathologists from several States, was probably due to the early and abundant build-up and distribution of inoculum especially virulent on watermelons.

PHYTOPHTHORA INFESTANS ON TOMATO:

Tomato late blight this year was of economic importance. It attacked sizeable acreages and affected the marketability of the crop. Estimated percent reduction in yield of late blight infected acreages, as shown in Table 1, varied from a trace to 95. Sources of infection included potato dump piles, volunteer potato plants, airborne spores, and southern-grown plants.

Noteworthy is the spread of late blight on tomatoes westward into Arkansas, Missouri, Iowa, and Nebraska (Figure 1).

Weather conditions this year were extremely favorable for the development of late blight (Figure 5). In the affected areas, mostly in the eastern to midwestern portions of the country, a warm winter, followed by a cool spring and warm-wet early summer with a cool-wet mid-summer, provided ideal conditions for the development of blight.

Fungicides used as sprays and dusts, as given in Table 2, included Dithane, Parzate, fixed coppers, Bordeaux mixture, nabam plus zinc sulfate, basic copper sulfate, zineb, tribasic copper, and ziram and copper. Control measures were effective when materials were properly applied under favorable spraying and dusting conditions. Table 2 lists materials used, formulae, results obtained, and the effectiveness of the control measures.

PHYTOPHTHORA INFESTANS ON POTATO:

Although not causing as much economic loss as on tomato, late blight on potato was prevalent this year in areas shown in Figure 2. It was distributed throughout the Atlantic Coast seaboard

States and in the Provinces of Ontario, Quebec, New Brunswick, and Nova Scotia, Canada. Sources of inoculum included diseased seed potatoes, cull piles, wind-blown spores from more southerly regions, and infected southern-grown tomato plants. Reports indicated that estimated reduction in yield, for the most part did not exceed 10 percent, except in Pennsylvania, where reduction in yield amounted to 100 percent in affected fields but averaged 9 percent for the State.

Ideal weather conditions for potato blight development occurred in most of the potato-producing regions during the past summer, i. e., cool-wet weather for extended periods of time.

Fungicides employed (Table 3), in the control of potato late blight included Dithane D-14, nabam, fixed coppers, Bordeaux mixture, zineb, basic copper sulfate, tribasic copper, and yellow copper oxide. In general, spraying and dusting of the fields together with local dry weather conditions, prevented local epidemics and kept the disease in check.

PERONOSPORA TABACINA ON TOBACCO:

The distribution of tobacco blue mold in 1950 is shown in Figure 3. Widespread severity was reported in certain localities, but the disease on the whole was relatively mild, despite its general distribution throughout the tobacco-growing areas.

Fungicides used (Table 4) indicated the preference for Fermate. Other fungicides employed were Dithane Z-78, Parzate, and zineb. There was no plant shortage and treatment for blue mold control was generally reported as very satisfactory this year. Reports have indicated a trend toward dusting rather than spraying for blue mold control, as dusts can be applied more rapidly and with less labor.

PSEUDOPERONOSPORA CUBENSIS ON CUCURBITS:

Cucurbit downy mildew occurred along the Atlantic Coast seaboard and in the southern part of Texas. Losses were reduced, since this disease appeared later than normal when the crop was mature or nearing maturity. (Figure 4).

Fungicides used in controlling cucurbit mildew, (Table 5) included nabam plus zinc sulfate, Copper A, fixed copper, Dithane D-14 and Z-78, Parzate, tribasic copper sulfate, zineb, and Bordeaux mixture. Reports indicated that P. cubensis can be controlled by a spray schedule. According to reports coppers were injurious and carbamates probably offer the best control fungicides.

Table 1. Estimated percent reduction in yield of late blight infected tomato acreages, 1950.

State or Province	Acreages infected with Late Blight	Percent estimated reduction in yield of infected acreage	Source of Inoculum
Ala.	5,000	80 (most fields 90 loss or greater)	Windblown spores
Ark.	8,500	25-90	Unknown
Conn.		25	Airborne spores
Fla. Dade Co.	13,000	Less than 1 percent in area as a whole, perhaps up to 10 in about 200 acres.	?
Ill.	4,500 (42 percent of total canning acreage)	15	Mostly from southern-grown plants.
Ind.	60,000	1 ton per acre	In doubt. First observations of disease were in fields set with southern plants and also in fields with no obvious source.

Table 1. (Continued)

State or Province	Acreages infected with Late Blight	Percent estimated reduction in yield of infected acreage	Source of Inoculum
Ky.		25	Probably blown in from South.
La.	Less than 100	50-75	Unknown. Fresh market tomatoes were heavily infected with late blight in late April and May.
Mich.	5,000	10-80 in individual fields	Unknown
Miss.	3,000	95	Plants from Florida
N.C.	4,000	50	Imported plants; potatoes.
N.Y.	15,000	Less than 1 percent	Local; no southern plants involved.
Ohio	20,000	10 of canning crop; 20 of rest.	Questionable. Some came into So. Ohio on plants. It is unlikely that was only source of inoculum.
Pa.	24,000	Average 8 for State. Maximum unsprayed - 50	Southern-grown tomato plants and potatoes
S.C.	5,000	2	Potatoes (?)
Tenn.	25,000	75	Local and airborne
Va. (Norfolk)	10,000 - 12,000	Less than 5.	Southern-grown tomato plants
(Blacksburg)		75	
W. Va.	3,000 - 5,000	35	Unknown
Wis.	1,200	50-70	Probably from potato dump piles and volunteer potato plants.
Canada Quebec		Trace to 30	
Nova Scotia	65	7 (?)	Windblown from potato fields.

Weather in 1950

The extensive activity this past year of all the diseases included on our program, and also the appearance of several others, has prompted us to present a brief analysis of the effect of the weather on the disease picture this year.

Figure 5 shows, for the entire country, the prevailing weather conditions during the months from January through September, 1950. At a glance one can see the similarity of weather conditions in January and February in the areas where downy mildew diseases occur. These conditions were warm-wet and warm-dry. The weather of March and April was completely opposite to that of January and February, cold-wet and cold-dry conditions obtaining in the eastern half of the country. May stands alone with principally warm-wet conditions in the eastern half of the country. In June heavy precipitation occurred along the coastal regions of Texas and Louisiana. Rainfall in showers and thunderstorms occurred from Illinois to West Virginia. Temperatures above normal and dry conditions prevailed in the Southeast and along the Atlantic Coast. The summer months of July, August, and September were characterized by cold-wet and cold-dry weather over most of the country. Generally speaking, therefore, the weather this year was extremely favorable for the incidence and development of mildew diseases.

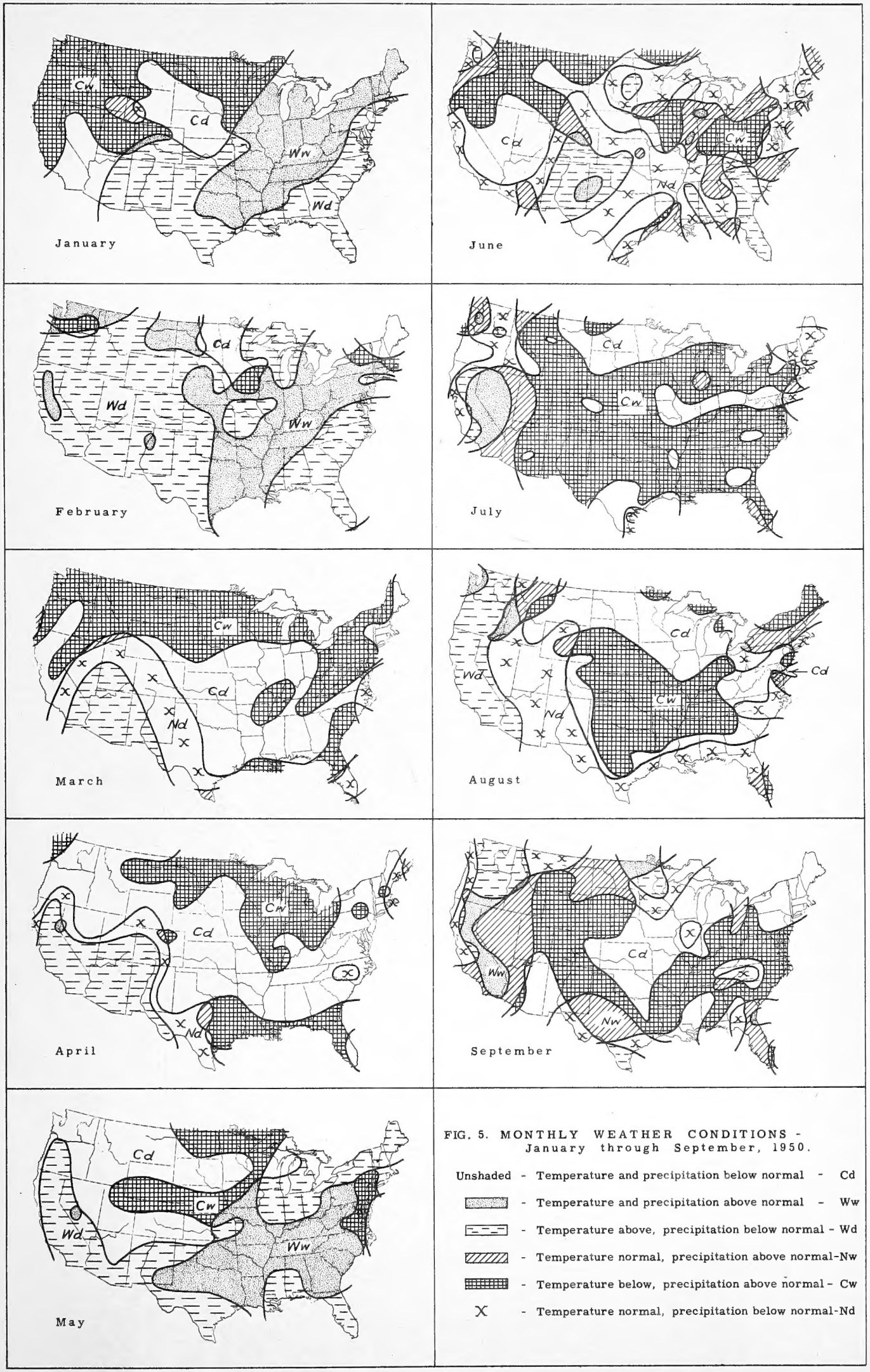

FIG. 5. MONTHLY WEATHER CONDITIONS - January through September, 1950.

Unshaded - Temperature and precipitation below normal - Cd

- Temperature and precipitation above normal - Ww

- Temperature above, precipitation below normal - Wd

- Temperature normal, precipitation above normal-Nw

- Temperature below, precipitation above normal - Cw

X - Temperature normal, precipitation below normal-Nd

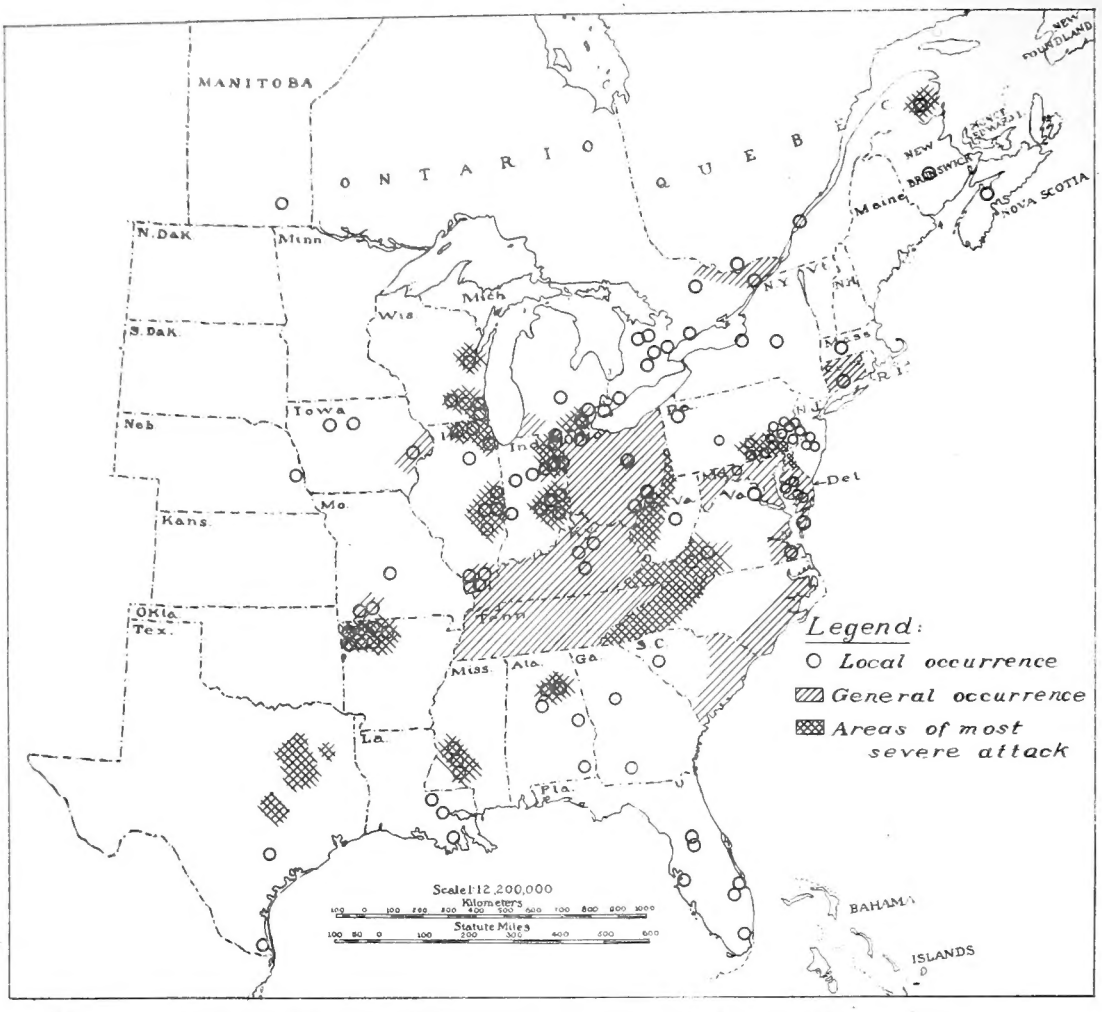

FIG. 1. DISTRIBUTION AND IMPORTANCE OF TOMATO LATE BLIGHT IN 1950.

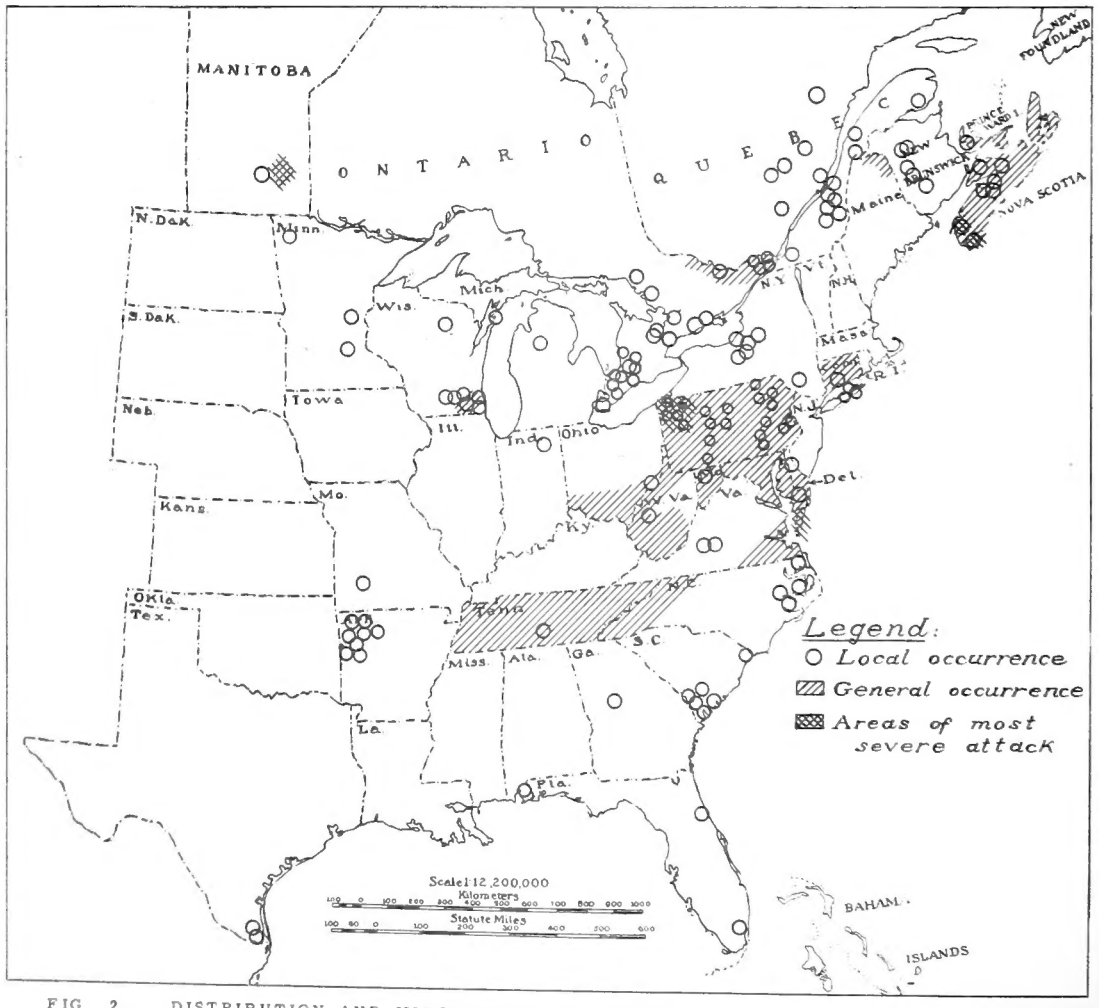

FIG. 2. DISTRIBUTION AND IMPORTANCE OF POTATO LATE BLIGHT IN 1950.

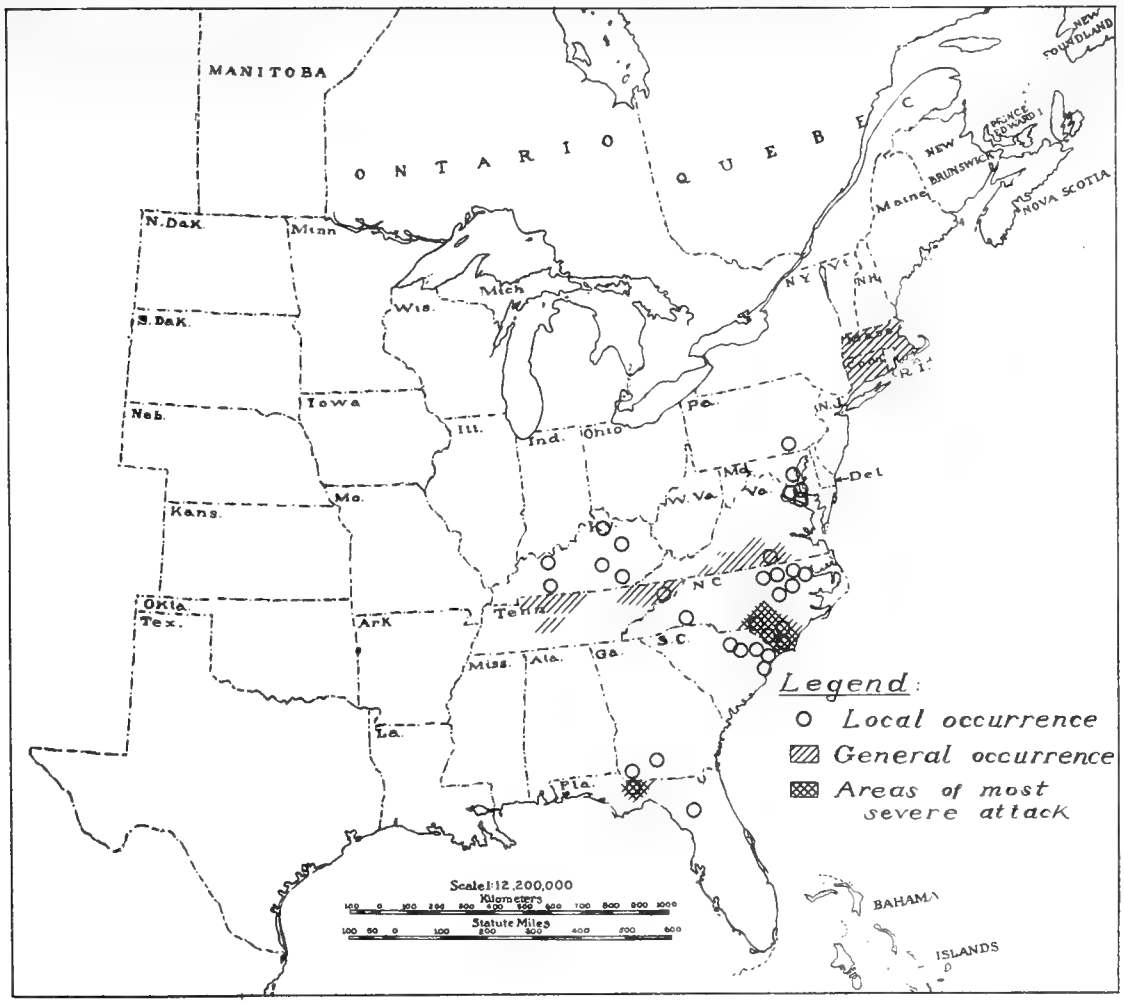

FIG. 3. DISTRIBUTION AND IMPORTANCE OF TOBACCO BLUE MOLD IN 1950.

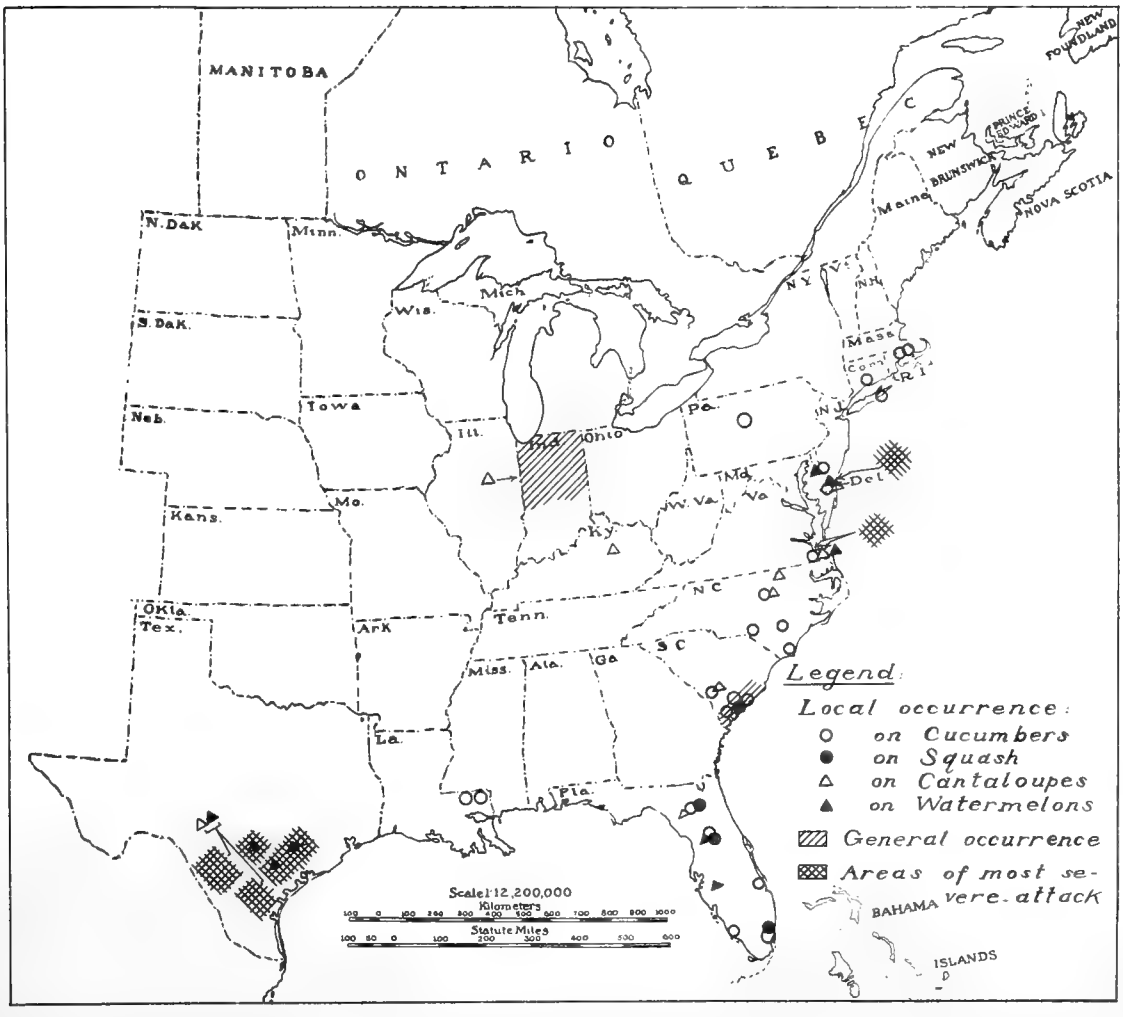

FIG. 4. DISTRIBUTION AND IMPORTANCE OF CUCURBIT DOWNY MILDEW IN 1950.

Table 2. CONTROL OF LATE BLIGHT ON TOMATO: Materials used as Sprays and Dusts and their effectiveness, 1950.

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
SPRAYS:					
Ala.	Liquid Parzate	2 qt. per 100 gal. plus 1 lb. $ZnSO_4$	20	Good	About half of the farmers in Etowah and Blount Counties of the North Alabama greenwrap area began a disease control program on fall tomatoes. After a couple of weeks of very rainy weather during early August, all but 7 or 8 farmers had abandoned the program due to severe blight damage. These farmers had not been able for various reasons, including the weather, to put the fungicides on as often as needed.
Conn.	Dithane	2-100	4.5	Fair	
	Fixed coppers	4-100	65	Good	
	Bordeaux	8-4-100	25	Good	
Fla. (Homestead)	Nabam plus zinc sulfate	2 qt., 1 lb./100 gal. (probably one-half of the growers used one-half lb. lime with the above formula)	100	Excellent (fair in 3 or 4 fields where application or schedule was inadequate)	Many growers use a fixed copper as a seedbed spray before late blight is reported in the area. To my knowledge, no one used copper sprays last year with the idea of controlling late blight, the seedbed use being nutritional as much as protective. One grower used Phygon XL (3/4 lb./100 gal.) experimentally; he reported good disease control, but his spray crew were irritated by the spray. Some airplane application of nabam and zinc sulfate did not afford the protection or control given by ground sprayers.
Ill.	Fixed coppers	2 lb. (Cu as metallic)/ 100 gal.	15	Good	Zerlate (1 appl.) used in alternating schedule prior to appearance of late blight; subsequent applications were Bordeaux or fixed copper. Fixed copper dusts appeared to hold blight in check, particularly in Vermilion (Ridgefarm) County.
	Bordeaux mixture	8-8-100	1	Good	
	Zerlate	2-100	5	See under "Remarks"	
Ind.	Basic copper sulfate	4-100	10	Good	Disease more widespread on tomatoes in Indiana than in any previous season of record. It was correlated with much above-normal humidities, consistently below-normal temperatures and above-normal rainfall, or very frequent rainfall.
	Zineb	2-100	1	Fair	
La.	Dithane D-14	2 qt./100 gal.	1		Small growers, who were affected with late blight in the spring, did not use sprays or dusts in general. Spraying and dusting is done by some of the larger growers in Plaquemines Parish, where late blight was not reported.
	Bordeaux Mixture	2-2-50	3		
	Fixed coppers		15		
Mich.	Bordeaux	2 applications	E	Excellent (applications made after blight started)	Late blight started early in August and weather conditions were favorable for blight. Untreated fields sustained heavy losses. However, sprayed fields came through with 15 to 18 tons per acre.
	Dithane	5 applications		good	
	Insoluble coppers	4 applications		Good	
Miss.	Copper A	4-100	?		Control measures started too late -- ergo, ineffective. We had an unusually windy spring this year, and I believe that contributed more than anything else to the total loss. Temperature and rainfall about same as past 2-3 years. In past 3 years local damage severe, but fungus was not so widespread as this year.
	Parzate	2-100	?		
	Dithane Z-78	2-100	?		
N. Y.	Ziram &copper	Ziram (2 lb./100 gal.) 8-4-100 Bordeaux	85+	Excellent	Most, if not all, growers used the split schedule of ziram and copper, usually in order of Z-Z-C-Z-C. In some areas, more copper was applied because of a late blight threat. In these areas tomatoes suffered more from anthracnose. In some non-sprayed (very few) fields, tomatoes were a complete loss from late blight.
N. C.	Bordeaux	4-4-50	0.1	Good - (Injury)	Acreages largely made up of home gardens and small market-gardening plantings. No serious damage to early green-wrap crop in eastern North Carolina.
	Fixed coppers	4-100	1.0	Good	
N. Dak.	Zerlate		10		
	Dithane Z-78		0		
	Cop-O-Zinc		0		
	Cuprocide		0		
	Phygon		0		
	Basic copper		50		
Ohio	Bordeaux	8-6-100	10	Excellent	Occurrence of severe losses was spotty. Areas no more than 25 miles apart varied widely in percentage of acreage affected and in percentage of fruits attacked.
	Fixed coppers	4-100	30	Excellent to good	
	Zineb (S)	4-1-100 liq. 2-100 dry	10	Good to fair	
Pa.	Dithane-Parzate etc.	2 qt.	5	Good	Conditions were quite good for late blight in western Pennsylvania during the late season, whereas the spread in southeast was early.
	Zerlate & fixed copper	1 and 2 lb. cop	25	Fairly good	
	Zerlate early, copper late	2 lb. Z and 4 lb. cop	40	Fair	
	Fixed copper	4 lb./100 gal.	20	Good	
S. C.	Dithane D-14	2-1-100	5	Excellent	Late blight appeared but was held in check by dry hot weather. Tomato prices good. No appreciable losses even in unprotected tomatoes.
Tenn.	Bordeaux	4-4-50	2	Excellent	Where numerous applications of fungicide made, good results reported.
	Fixed copper	2 lb. 50% powder	5	Poor	

Table 2. (Continued)

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
SPRAYS: (Cont.)					
Va. (Blacksburg)	Insoluble copper	Various	15	Good	
	Zineb	Various	1	Good	
Va. (Norfolk)	Dithane Z-78	Manufacturer's recommendation	1	Good	Questionable results in control because, in fields where stem canker phase was present, dusts failed to check the disease. High temperatures during harvest season kept blight in check.
W. Va.	Bordeaux mixture	8-8-100	10	Good	The results with zineb this year were excellent. At the higher concentrations (3 pounds per 100) some yellowing of foliage was noted. It is not known whether the zineb was responsible directly or merely acted as a contributing factor.
	Tribasic copper (53%)	4 lb./100	5	Good	
	Zineb	2-3 lb./100	1	Excellent	
Wis.	Fixed coppers	Manufacturer's recommendation	35	Poor, as no fungicide used until blight appeared and in most cases only one or two applications put on.	Late blight really hit our main tomato canning area (Racine - Kenosha) hard. Weather conditions were ideal a good part of the time. Part of the acreage was airplane dusted and part was ground sprayed using side boom sprayer.
	Bordeaux	Not known			
	Carbamates	Manufacturer's recommendation	Very few		
Canada (Nova Scotia)	Bordeaux	4-3-40	50	Excellent	Commercial growers did an excellent job of holding blight in check. Most household gardens were destroyed by the middle of September.
	Zerlate + Bordeaux	2-100 gal. Z + 4-3-40	50	Excellent	
DUSTS:					
Ala.	6% zineb	25 lb./acre	20		See Alabama control in Spray schedule
	6% copper	25 lb./acre	10		
Ark.	Tribasic copper sulfate	7% dust	Very few	Good	
Conn.	Dithane		.5	Fair	
	Fixed coppers		5	Good	
Ind.	Basic copper sulfate	7%	5	Poor	
Ill.	Fixed coppers	7%	5	Good	
La.	Dithane	6% Dithane Z-78	2		
	Copper		1		
Miss.	Copper A	12%	?		
	Parzate	12%	?		
	Dithane Z-78	12%	?		
N. Y.	Ziram & fixed copper	10% ziram 7% metallic Cu	2	No late blight, but poor control of early blight.	
N. C.	Copper-lime	20-80	0.1	Good (Injury)	
	Fixed coppers	7% Cu	10	Good	
Ohio	Fixed coppers	14-86	30	Fair to poor	
Pa.	Fixed copper	7%	10	Fairly good	
S. C.	Tribasic copper sulfate	6-7% metallic Cu	35	Excellent	
	Dithane Z-78	6%	10	Excellent	
Tenn.	Zineb	1 1/2 lb. tech./100 gal.	1	Poor	
	Fixed copper	7%	5	Poor	
Va. (Blacksburg)	Insoluble copper	Various	15	Fair	
	Zineb	Various	1		
Va. (Norfolk)	Fixed coppers	7%	10	Questionable	Where stem canker phase present, dusts failed to check the disease.
	Dithane Z-78	Manufacturer's recommendation	10	Questionable	
	Parzate	Manufacturer's recommendation	5	Questionable	
W. Va.	Yellow copper oxide	5% metallic Cu	10	Poor	
	Tribasic copper	7% metallic Cu	15	Good	
	Zineb	10%	3	Excellent	
	Copper-lime	20-80	8	Good	
Wis.	Fixed coppers	Manufacturer's recommendation	25	Where weekly applications were kept up had fair control.	See Wisconsin control in Spray schedule
	Carbamates	Manufacturer's recommendation	Very few		

Table 3 CONTROL OF LATE BLIGHT ON POTATO: Materials used as Sprays and Dusts and their effectiveness, 1950.

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
SPRAYS:					
Ala.	Dithane D-14	2 qt./100 gal.	10	Excellent	Late blight damaged 200 to 300 acres of potatoes in Alabama where no disease control was practiced. Most growers dusted or sprayed and this, together with fair weather, prevented an epidemic.
Fla. (Dade Co.)	Nabam plus $ZnSO_4$	2 qt., 1 lb./100 gal.	100	Excellent	Late blight in County during last two-thirds of crop growth but effective spraying kept it from potatoes. One grower tried airplane application of nabam spray on 40 acres. He reported late blight in this acreage but none in an adjacent 40 acres sprayed with a ground machine.
Fla. (Hastings)	Nabam	2 qt. nabam, 1 lb. zinc sulfate/100 gal.	80	Excellent	Late blight was mild as compared with an average year.
Ind.	Zineb	2-100	80	Good	Disease severe only where limited number, 5-10, sprays applied or where poor drainage resulted in prolonged wet soil. Considerable tuber blight in late potatoes in home gardens on mineral soil.
	Basic copper sulfate	4-100	10	Good	
La.	Dithane D-14	2 qt./100 gal.	10% of acreage		Although late blight was not reported from the spring crop of potatoes, the sprayed and dusted fields in general appeared to be in better condition than the untreated fields. This was due largely to insect control with insecticides used in conjunction with the fungicides and, perhaps, to some measure of early blight control.
	Fixed coppers		5% of acreage		
	Bordeaux mixture	4-4-50	5% of acreage		
Minn.	Parzate and Dithane		10±	Good	Surveys covered Northern Minnesota, Hollandale, and Twin City areas.
	Fixed coppers		10±		
N. C.	Bordeaux mixture	8-6-100	10	Good	Estimates only. A good crop of potatoes was produced in the early and late sections, but blight did reduce yields in local areas.
Ohio	Bordeaux	8-8-100	10	Excellent to good. (Many growers used Bordeaux in last spray only)	Late blight tuber rot quite general in late crop; seldom over 5%. Little evidence of disease was present in many fields as infection occurred very late (after mid-Stepember).
	Fixed coppers	4-100	5	Good to fair	
	Zineb (s)	4-1-100 liquid			
		2-100 dry	80	Excellent to good	
Pa.	Dithane or Parzate	2 qt./100 gal.	10	Fair	DDT used in most sprays and dusts. Liquid Parzate and Dithane, 2 lb. plus 1 lb. zinc sulfate. Blight got out of hand for many large growers using organics and also in some cases where copper sprays were used. Spray rings had more trouble than usual in keeping blight in check in areas northwest of State College. Growers using organics allowed blight to get a head start before switching to copper, with disastrous results in a number of cases.
	Dithane or Parzate early, Fixed copper, etc., late		50	Fairly good	
	Fixed copper	4 lb./100	25	Fairly good	
	Bordeaux	8-4-100	15	Good	
S. C.	Dithane D-14	2-1-100	Trace	Excellent	Late blight appeared, but caused little or no damage Sebago grown almost exclusively except in Horry County. Sebago resistant (partially) and has never suffered severely from blight. All fungicides gave excellent blight control.
Tenn.	Bordeaux	4-4-50	5	Excellent	
	Fixed copper	2 lb. 50% powder	2	Good	
W. Va.	Bordeaux mixture	8-8-100	20	Good	
	Tribasic copper(53%)	4 lb./100	5	Good	
	Zineb	2-3 lb./100	.5	Excellent	
Wis.	Bordeaux	8-8-100 at start; 8, 10-5-100 at finish	1 to 2	Good in north; apparently about same as carbamates in Kenosha area.	In some areas not enough applications were used during the season to give the fungicide a fair trial. It appeared that the carbamates gave better control in the Kenosha area than the copper materials. This was not true in the northern growing areas.
	Fixed coppers	Manufacturer's recommendation	3 to 5	Poor to fairly good	
	Carbamates	Manufacturer's recommendation	60	Poor to good	
Canada (New Brunswick)	Fixed copper and Bordeaux	Bordeaux 4-2-40 Imperial gallons. Fixed copper manufacturer's directions.		Good control	
(Nova Scotia)	Fixed coppers (early	4 to 7 lbs	60	Poor	Blight has destroyed from 50-100% of crop in Yarmouth and Dibgy Counties. Ten to 25% loss where some spraying was carried out. Many growers used fixed coppers early in season and switched to Bordeaux when the blight began to creep in. All growers switched in early September to Bordeaux.
	Bordeaux (seed potatoes)	4-2-40	100	Good	
(Prince Edward Island)	Bordeaux	10-5-100		Control depended on number of applications and timeliness of same.	Severe epiphytotic: Two heavy rains late in August washed spores into soil, resulting in tuber infections. Chemical vine killing was widely used.
	Basi-Cop	4 to 5-100			
	C.O.C.S.	4 to 5-100			
	Dithane D-14	2 qt.-100			
Quebec	Bordeaux mixture			Materials used gave a fairly good protection to the foliage.	
	Coppers with DDT				

Table 3. (Continued)

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
DUSTS:					
Ala.	Zineb	6%	40	Excellent	
	Copper	5%	30	Good	
Fla. (Hastings)	Tribasic copper	6 to 10 % metallic	20	Good	
La.	Dithane	6% Dithane Z-78	3% of acreage		
	Copper dusts		5% of acreage		
Minn.	Parzate and Dithane		70±	Good when correctly used.	
	Fixed coppers		70±		
N. C.	Fixed copper dusts	7%	60	Good to poor	
Ohio	Fixed coppers		2	Fair	
Pa.	Fixed coppers	7% & DDT	5	Fair	
S. C.	Tribasic copper sulfate	6-7% copper	60	Excellent	
	Dithane Z-78	6% Dithane	10	Excellent	
Tenn.	Fixed coppers	7%	1	Good	
Va. (Norfolk)	Fixed coppers	7%	15	Questionable	Questionable results because of local showers in the Cape Charles area.
	Dithane Z-78	Manufacturer's recommendation	15	Questionable	
	Parzate	Manufacturer's recommendation	5	Questionable	
W. Va.	Yellow copper oxide	5% metallic Cu	15	Poor	
	Tribasic copper sulfate	7% metallic Cu	10	Good	
	Zineb	10%	1	Excellent	
	Copper-lime	20-80	5	Good	
Wis.	Fixed coppers	Manufacturer's recommendation	Very few	Poor in general	
	Carbamates	Manufacturer's recommendation	Very few	Not known	
Canada (New Brunswick)	Fixed copper	Manufacturer's directions		Good	
(Prince Edward Island)	Oxychlorides and tribasics	30 to 40 lb.			

Table 4. CONTROL OF TOBACCO BLUE MOLD: Materials used as Sprays and Dusts and their effectiveness, 1950.

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
SPRAYS:					
Conn.	Fermate	Start with 1 lb. to 50 gal. of water but increase later to 2 lb.	95	Results have been almost perfect where applied twice a week. Infection was light this year, however, even in unsprayed beds. A number of Shade growers sprayed the fields with either Fermate or Dithane during an unusual outbreak in July. Not much data on results because the trouble soon stopped anyway.	The Fermate method of control is now standard here and is quite satisfactory, so we are not doing any more experimenting. Dithane is just as good, but the growers are in the habit of using Fermate so why change?
Ky.	Fermate		Very small	No need because of mild outbreak.	Blue mold was very mild this year because of very little carry-over from last year. It is gradually reducing in injury from year to year as it did between 1937 and 1944.
N. C.	Fermate Dithane Z-78 Parzate	4-100 3-100 3-100	22 1 few	Good Good Good	More beds were successfully treated for blue mold control in 1950 than in any previous season . There was no plant shortage due to blue mold. Injury from weed control chemicals, drought, low temperatures, and insects caused many plant bed failures in some sections. All fungicides gave satisfactory blue mold control when properly used. There seems to be a strong trend toward the use of dusts as compared with sprays.
Pa.	Copper & Fermate Zerlate or Parzate	8-4-100 2 lb.	85 5	Good Fair	Downy mildew did not get started to any degree this year. Spray schedule calls for Bordeaux 8-4-100 early and Fermate at 3 lb. later. Fixed copper is an alternate for Bordeaux.
S. C.	Fermate Parzate Z-78 5379 (Carbide & Carbon) * 5400 (Cabride & Carbon) *	4 lb./100 3 lb./100 3 lb./100 1 lb./100 1 lb./100	few few few none none	Good Good Good Good Good	* New experimental fungicide from Carbide & Carbon Chemical Corp.
Tenn. (Greenville)	Ferbam (Fermate)	2 lb. in 50 gal. of water	10	Good	Good control of disease was secured with both ferbam and zineb using above dosages regularly at this Station. The zineb dust treatment was preferred because it could be applied faster than the spray with less labor involved. Prepared fermate dusts were not generally available. Disease appeared first in East Tennessee this year; whereas last year many plant beds were destroyed in Coffee County, Middle Tennessee, several days before appearance was noted in East Tennessee.
(Knoxville)	Ferbam Zineb	3 lb. tech./100 gal. 3 lb. tech./100 gal.	10 1	Excellent	A few growers use P. D. B. with good effect.
Va.	Ferbam	3 lb./100 gal.	80	Excellent	
DUSTS:					
Conn.			Occasional grower	Results O.K.	
Fla.	Fermate Dithane Z-78 Parzate	20% 10% 10%	50 20 10	Good Good Good (some injury)	Dusts applied 3 times a week from 15 to 35 lb. per acre depending on size of plants. Dithane Z-78 and Parzate dusts have slightly better physical properties than Fermate dust. Some growers omitted (or discontinued) dusting because plants were growing too fast.
N. C	Fermate Dithane Z-78 Parzate	15% 10% 10%	32 6 1	Good Good Good	There seems to be a strong trend toward the use of dusts as compared with sprays.
S. C.	Fermate Z-78 Parzate	15% 10% 10%	about 50 few few	Good Good Good	
Tenn. (Greenville)	Zineb (Dithane)	5% dust	2	Good	
Tenn. (Knoxville)	Ferbam Zineb	10% dust 5% dust	5 1	Good Good	Zineb dust treatment was preferred because it could be applied faster than the spray with less labor involved.
Va.	Ferbam	15%	10	Excellent	

Table 5. CONTROL OF CUCURBIT DOWNY MILDEW: Materials used as Sprays and Dusts and their effectiveness, 1950.

State or Province	Materials	Formula or Dosage	Percent growers using	Results	Remarks
SPRAYS:					
Fla. (Cucumbers)	Nabam + zinc sulfate	2 qt., 1 lb./100 gal.	100	Excellent where well applied.	Cucumber acreage is increasing. This is due to the fact that downy mildew can be controlled when a regular spray schedule using the dithiocarbamates is followed.
(Squash)	Nabam + $ZnSO_4$	2 qt., 1 lb./100 gal	5-10	Good	Summer squash usually is not sprayed for disease control in this area. A few growers did spray this year. Their stated opinion was that spraying was beneficial. Downy mildew is a "maturity" disease on squash and there is some question whether spraying is profitable.
(Watermelon)	Copper A	4 lb./100 gal.	20	Poor control	The use of copper as a watermelon fungicide is not encouraged. I look for more and more use of the carbamates because the coppers give injury.
	Dithane D-14	2 qt./100 gal.	30	Good control	
	Dithane Z-78	2 lb. plus zinc/100 gal.	10	Good control	
	Parzate	2 lb./100 gal.	20	Good control	
	Tribasic copper sulfate	8 lb./100 gal.	20	Good control	
Ind. (Muskmelon)	Zineb	2-100	0	Good (in experiments)	Early plantings from transplants in southern Indiana mostly escaped the disease but were badly injured by Alternaria. Complete defoliation of most late plantings in August throughout rest of State.
La. (Cucumber)	Bordeaux mixture	4-4-50	20	Good	Downy mildew light to moderate on 1950 fall cucumber crop. Very dry weather prevailing with no rain. Cucumbers irrigated.
N. Y.			Nearly 100% commercial, about 80% home gardeners.		Ziram, although used successfully against anthracnose and Cladosporium, has proved wholly worthless against downy mildew. The zineb types of spray or dust, when applied twice a week, gave excellent control and somewhat better yields than did copper. The commonly used fungicide was copper; Bordeaux mixture 8-4-100 for cucumbers and squash, and 6 to 7% low soluble copper dust on muskmelons, applied weekly.
Pa.	Fixed copper	4 lb.	40	Good	Downy mildew appeared in the State too late this year to cause much appreciable loss. The first observed was near State College on Sept. 2 and just getting started. Losses in western Pennsylvania, even where sprays were not continued, were negligible. Powdery mildew caused more damage to cucurbits in northwestern Pennsylvania where downy mildew failed to appear.
	Zerlate	2 lb.	15	Fair	
	Dithane etc.	2-1-100	?		
S. C. (Cucumbers)	Dithane D-14	2-1-100	10	Excellent	Mildew appeared late in the spring and caused little damage. Price of cucumbers low and losses in dollars and cents negligible. Fall crop planted exclusively to mildew resistant varieties -- losses low except on a few farms where dusting poor. A hurricane during early September caused a considerable break in the fungicide schedule. The only growers who suffered severely from mildew (fall crop) had a 10-14 day interval between applications at this time Growers who sprayed or dusted properly at regular intervals had little or no disease. This was the first year that mildew was found on the resistant Palmetto variety except where this variety was planted adjacent to susceptible varieties. It appears that either we have a new race of the pathogen or just had better conditions for spread of the disease than in previous years.
	Dithane Z-78	2-100	trace	Excellent	
DUSTS:					
Fla. (Watermelon)	Copper-lime Dithane	20-80%	30	Poor control	
		6.5% active ingredient	40	Good control	
	Parzate	6.5% active ingredient	10	Good control	
	Tribasic copper sulfate	6% copper	20	Good control	
La. (Cucumbers)	Fermate	8-10%	40	Good	
	Fixed coppers	7% metallic Cu	30	Good	
	Dithane Z-78	6-8%	5	Good	
	Other miscellaneous materials	---	5	Poor to good	
N. Y.			Nearly 100% commercial; about 80% home gardeners.		See N. Y. control under Spray schedule
N. C. (Cantaloupes and Cucumbers)	Tribasic copper	5% Cu	10	Good	The disease developed much more severely on cantaloupe than on cucumber in 1950.
	Zineb	6%	0.5	Fair	

Table 5 (Continued)

State or Province	Materials	Formula or Dosage	Percent growers using	Results		Remarks
DUSTS (Cont.)						
Pa.	Fixed copper	5%	30	Good		
	Dithane or Parzate	8%	20	Fair to good		
	Bordeaux	8-4-100	5	Good		
S. C. (Canta-loupe)	Dithane Z-78	6%	10	Good		Root knot and dry weather were unusually serious during the two-week period prior to harvest.
(Cucum-ber)	Dithane Z-78	6% Dithane	75	Excellent		See S. C. control under Spray Schedule.
	Zerlate	8% Zerlate	5	Excellent	Where properly applied	
	Tribasic copper sulfate	6% metallic Cu	5	Excellent		
(Water-melon)	Dithane Z-78	6%	30	Good		Mildew of little importance. Other diseases (Fusarium wilt, anthracnose, gummy stem blight) severe.

CONCLUSION:

In summarizing, it appears that during 1950 the mildew diseases were potentially serious because of the extended periods of favorable weather over most of the eastern United States. However, in spite of these conditions, losses were held to a minimum by the timely application of control measures. A large share for this success in controlling these diseases can be properly attributed to the very excellent and prompt reporting of the Key Pathologists who are the mainstay of the Plant Disease Warning Service.

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